Denoising and sweeping frequency

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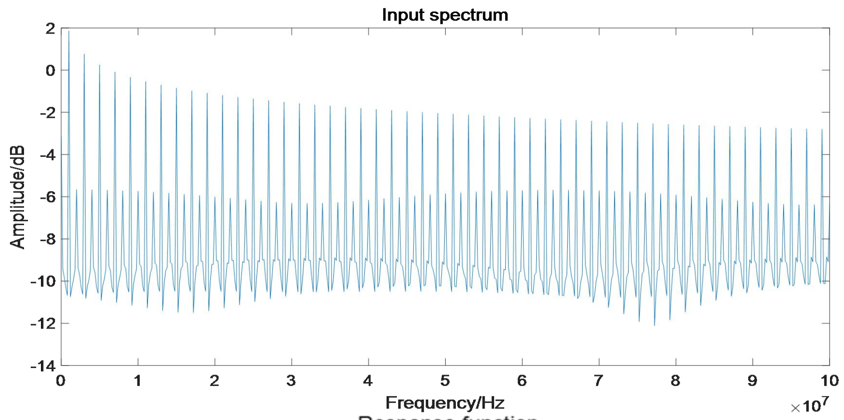
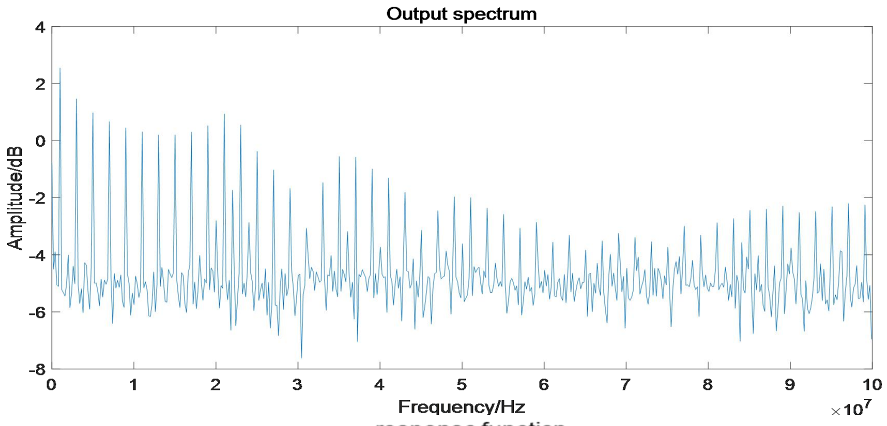
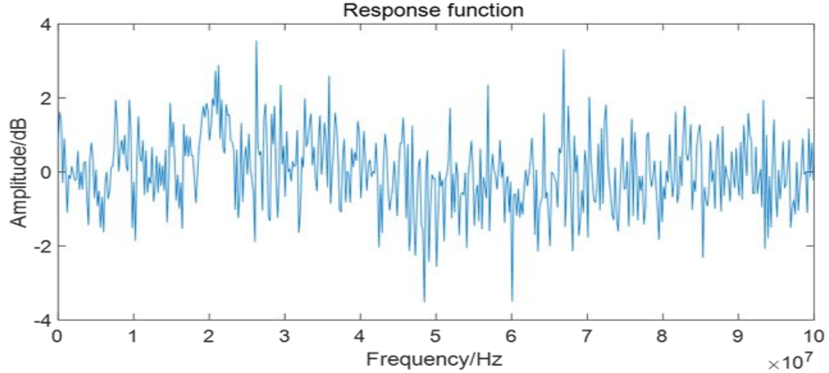
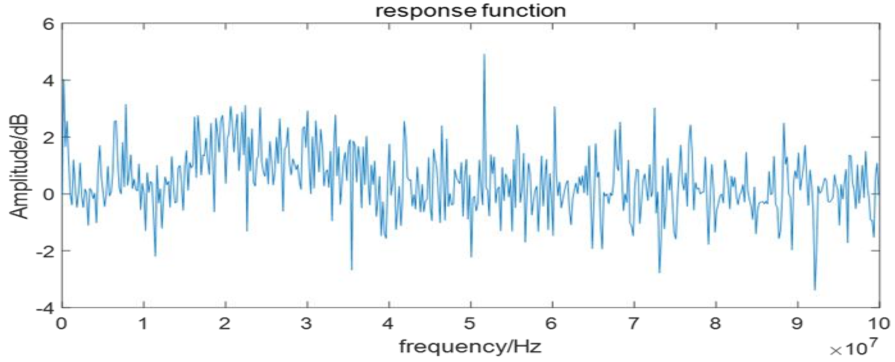
2020/11/11

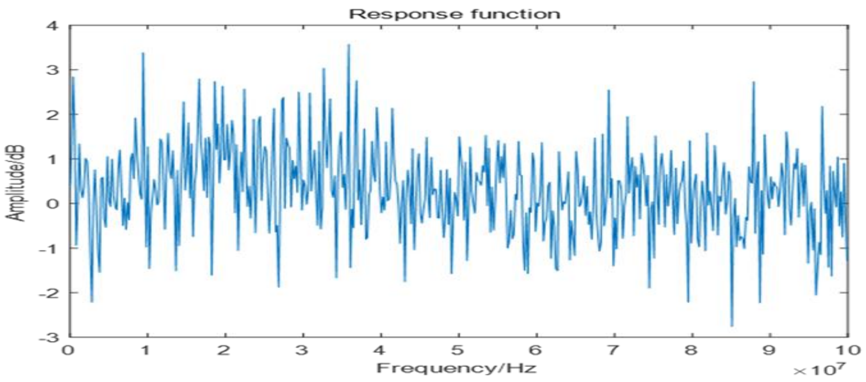
Review the last result

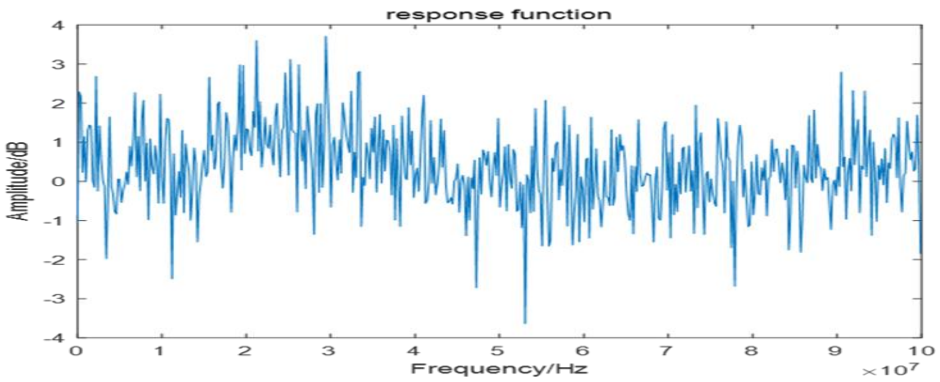








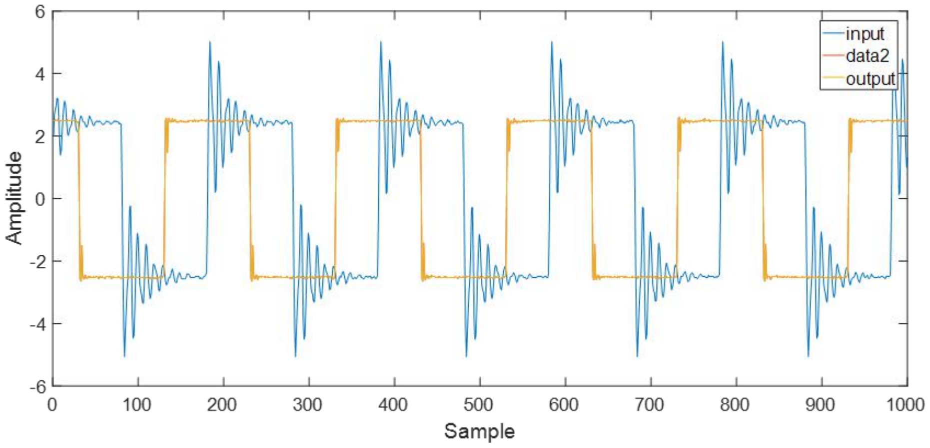


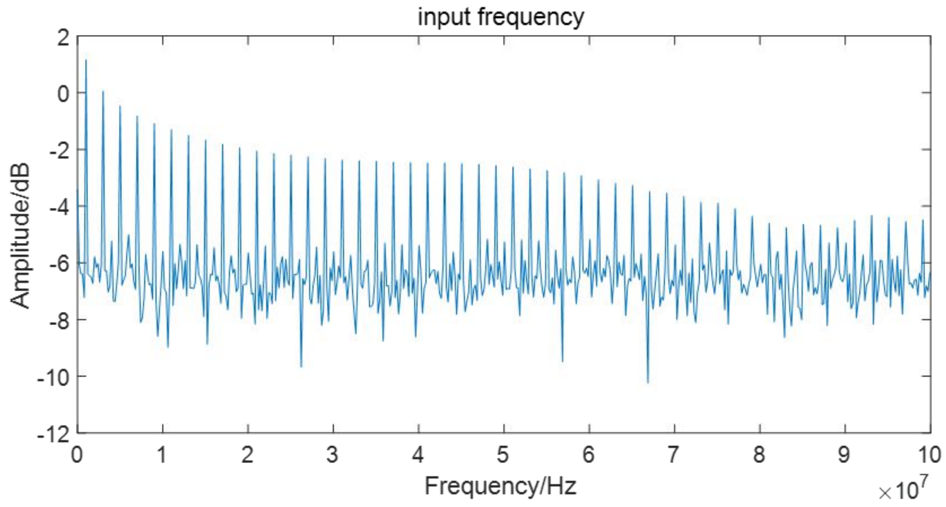


Concepts of sampling theorem

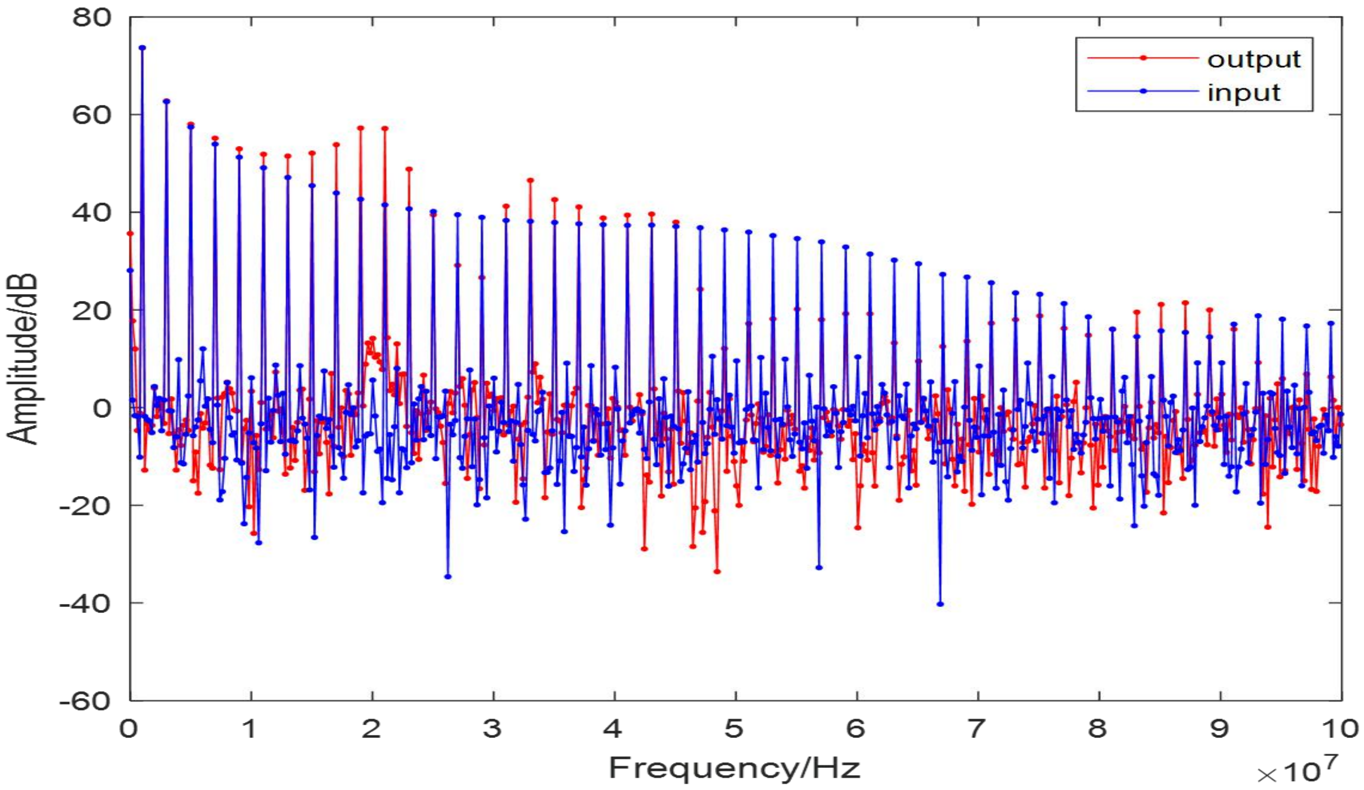
- Timing: Atomic clock , Measure one time. （question ） ？ ？ ？ ？ ？ ？ ？
- The sampling frequency : defines the number of samples per second to be taken from a continuous signal to form a discrete signal and is expressed in Hertz (Hz).
- Frequency resolution: can be understood as the minimum frequency interval df= F_S/N=1/Nt=1/, where N is sampling points .
- F_S is sampling frequency ,t is sampling interval ,T_S is the time length ,The longer the signal length is, the better the frequency resolution will be.

$$df = \frac{F_S}{N} = \frac{1}{t} = \frac{1}{NT_S}$$





Analyze the signal characteristics



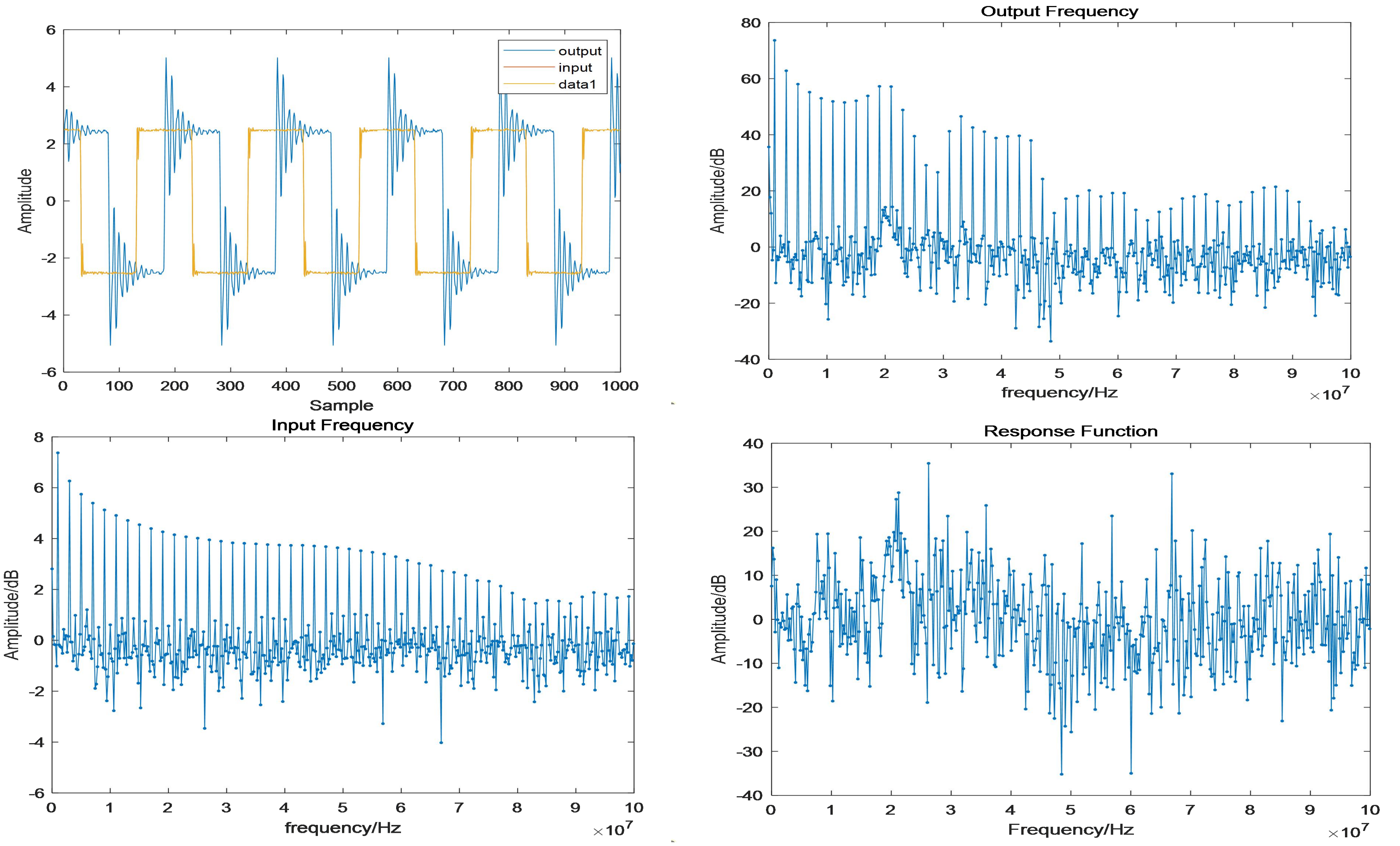
Signal=noise + pure signal

What is the characteristics about the noise

How to calculate response function /transfer function

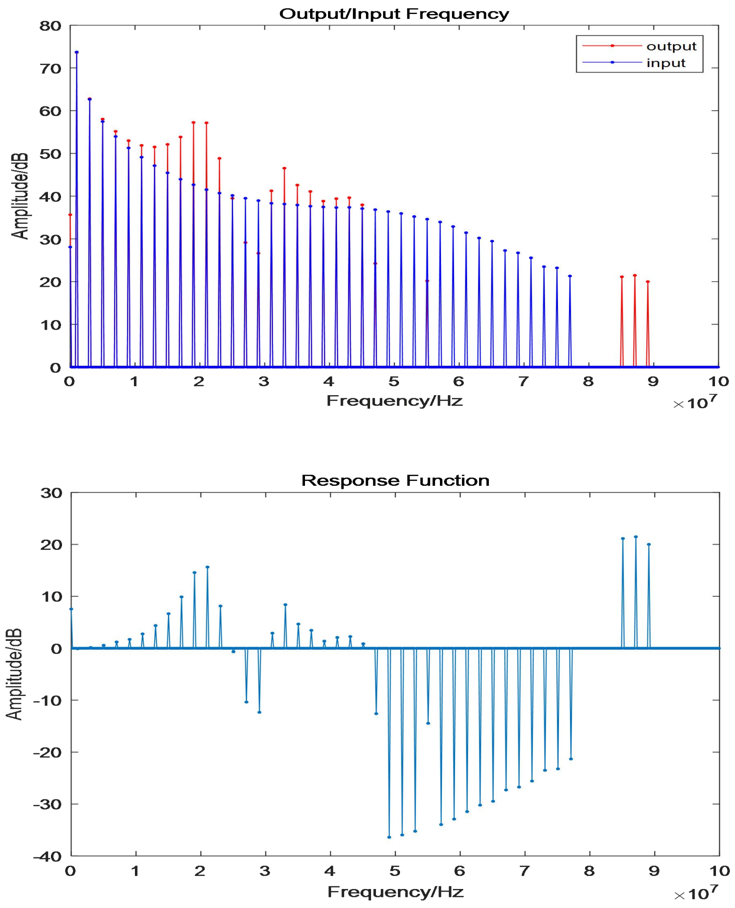
1 2 3 4………

Analyze the signal characteristics

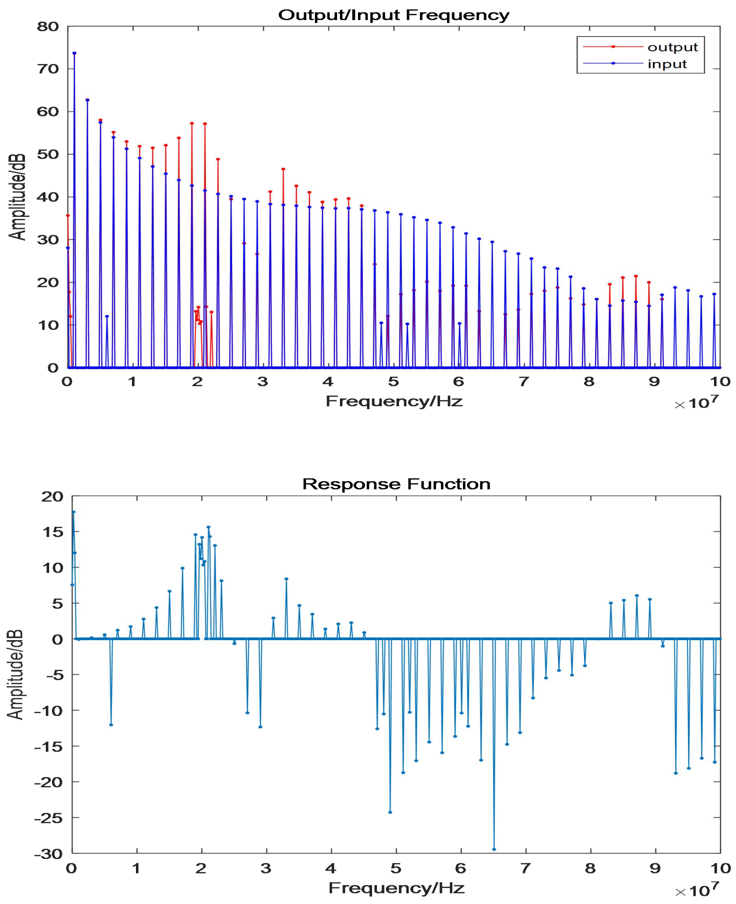


Analyze the signal characteristics

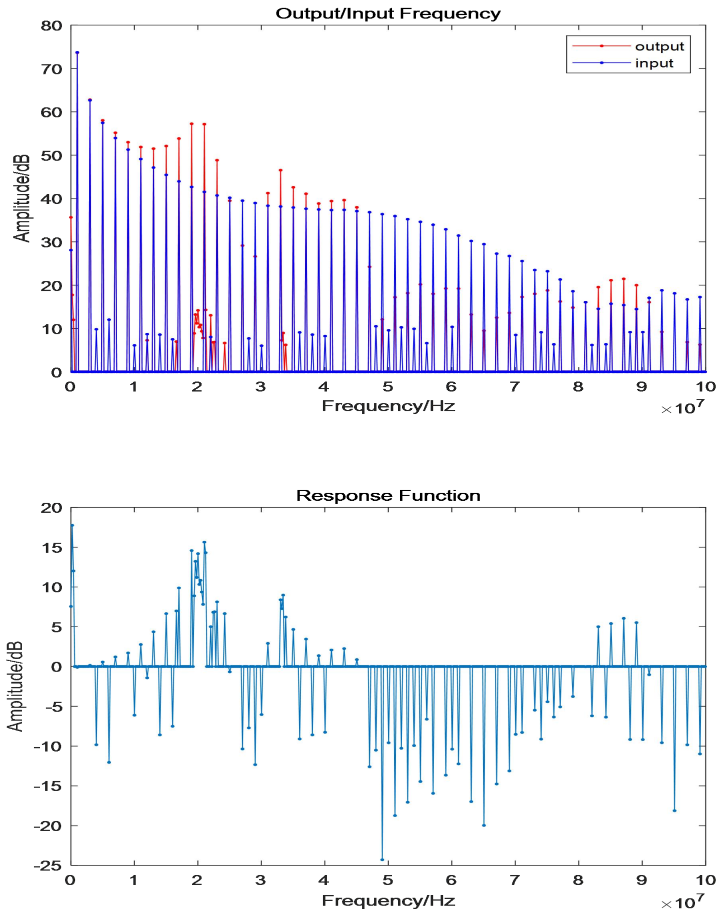
Method 1



Threshold=20

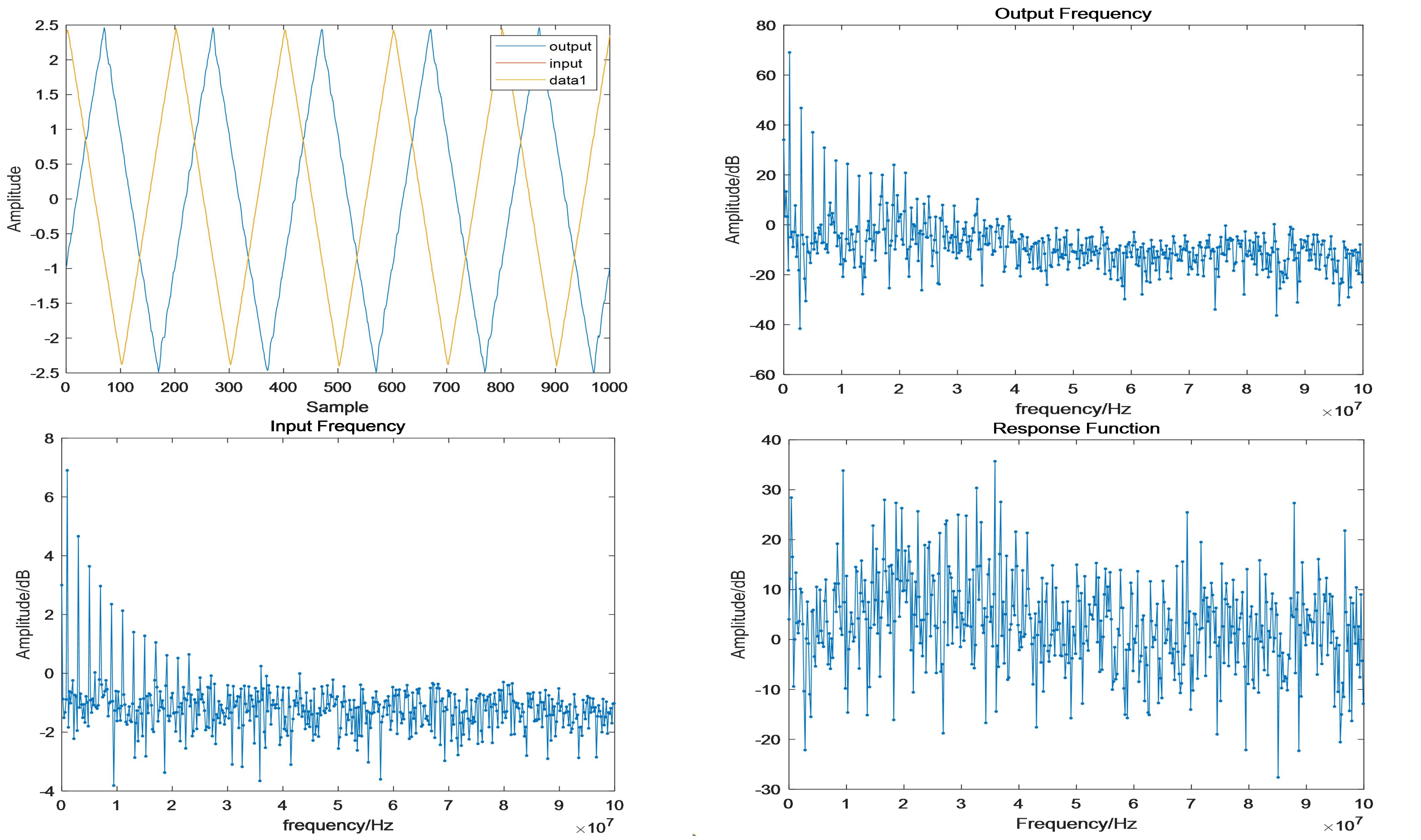


Threshold=10

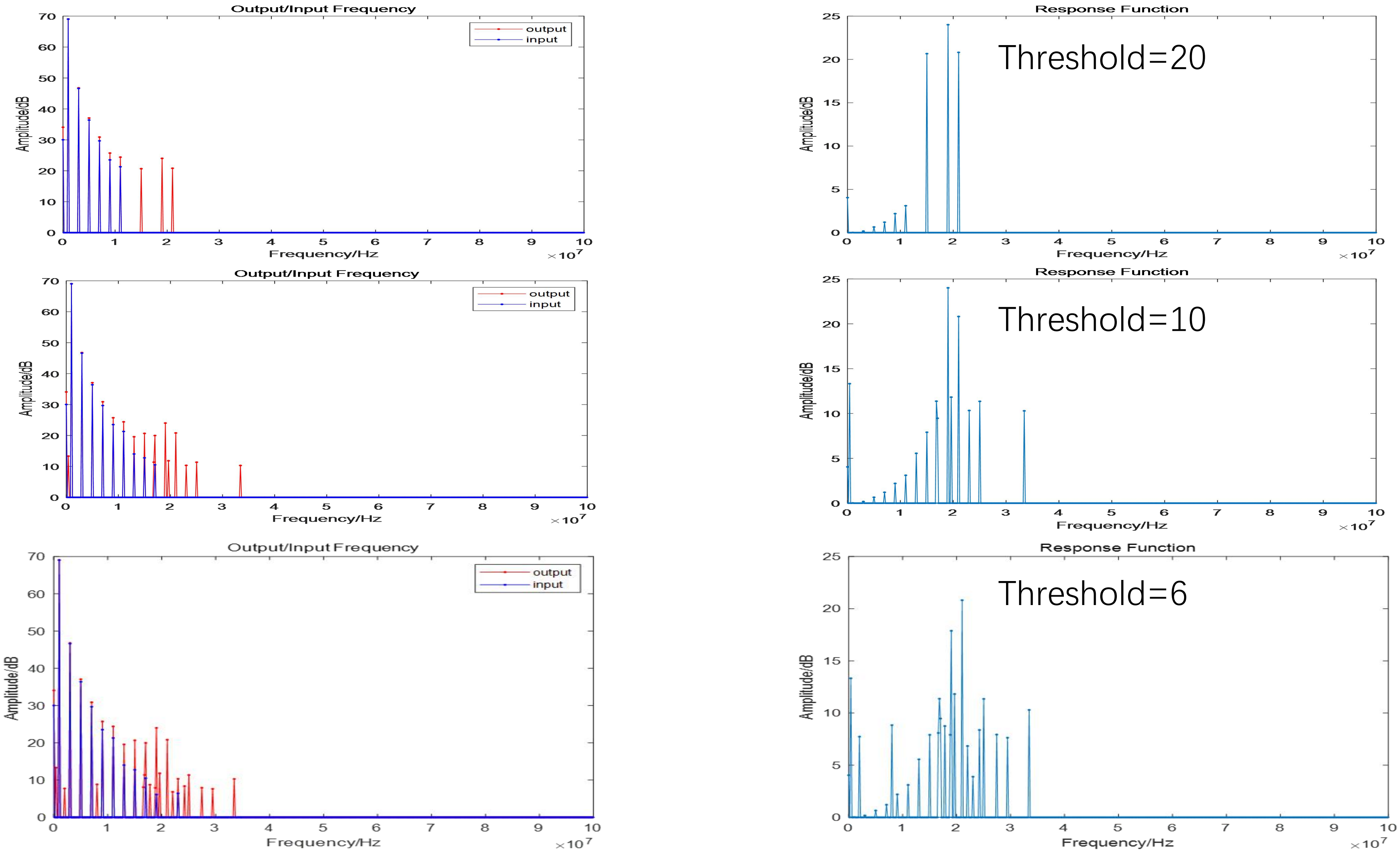


Threshold=6

Analyze the signal characteristics



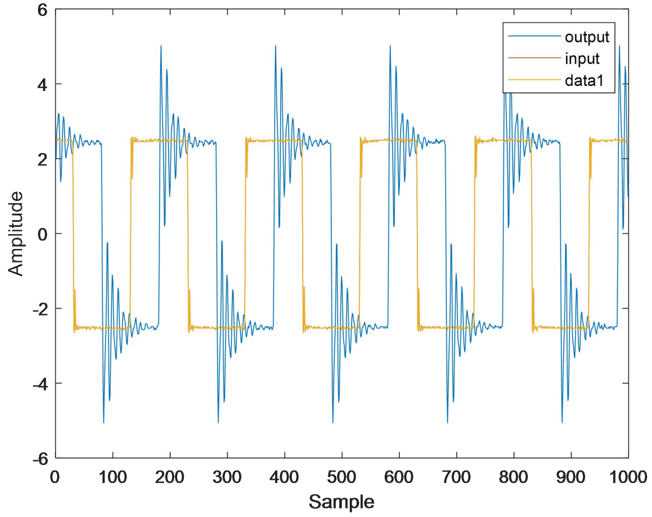
Analyze the signal characteristics

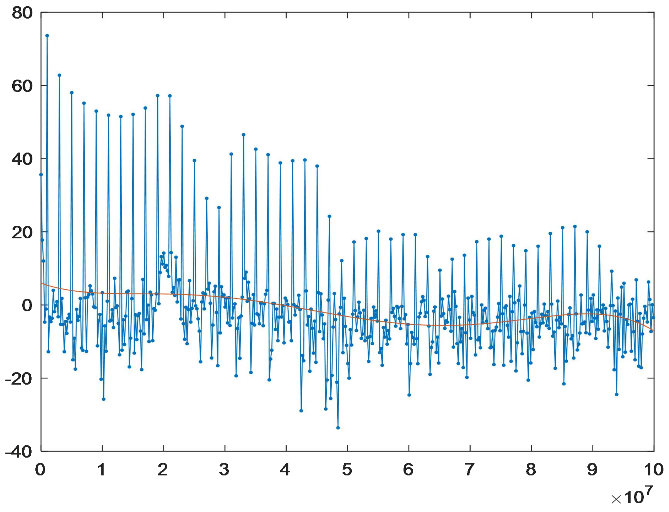


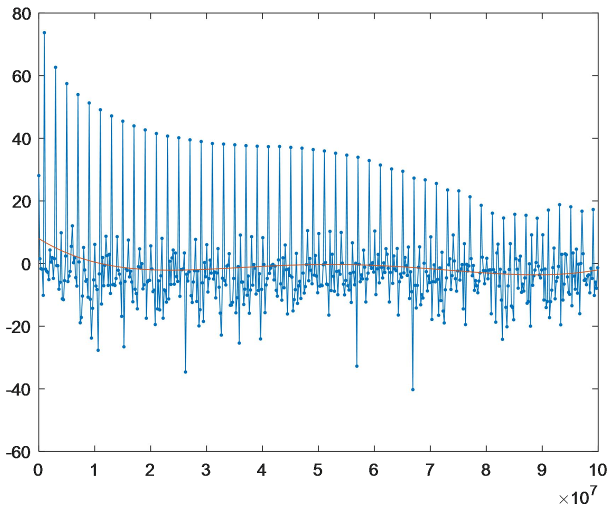
Analyze the signal characteristics

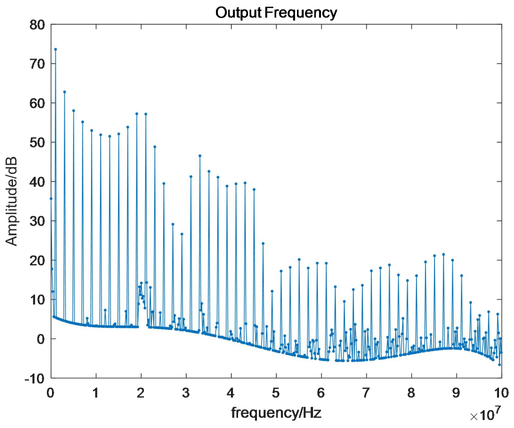
Method 2

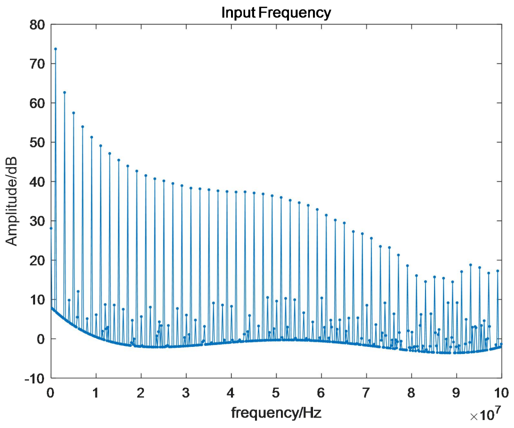
Fourth order fitting

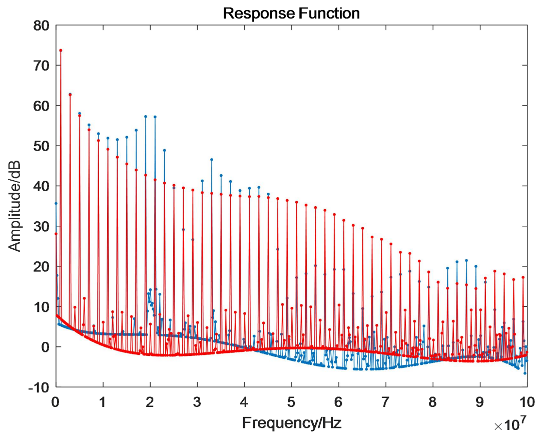


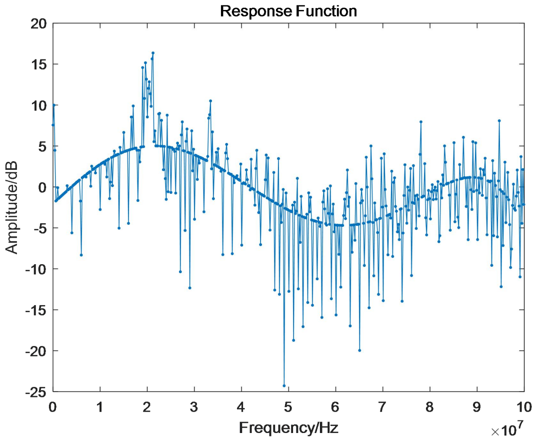






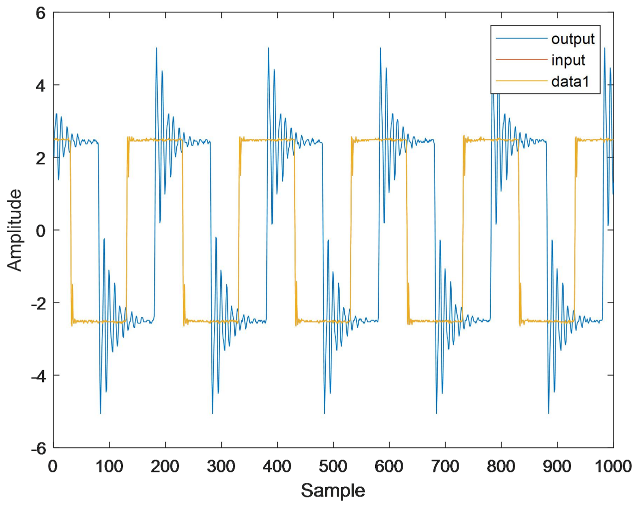


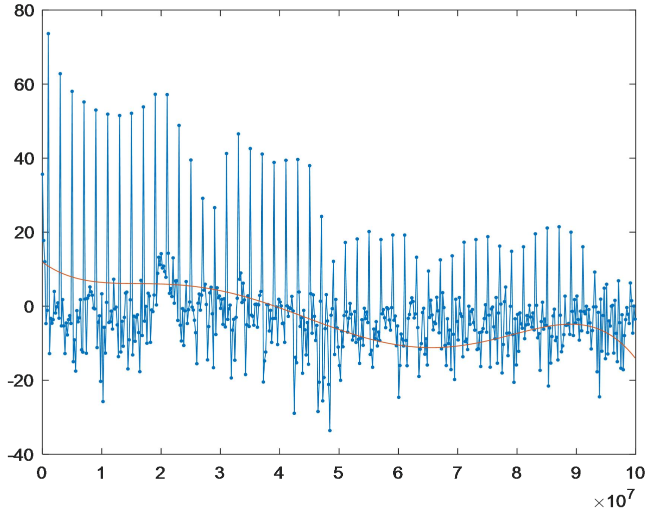


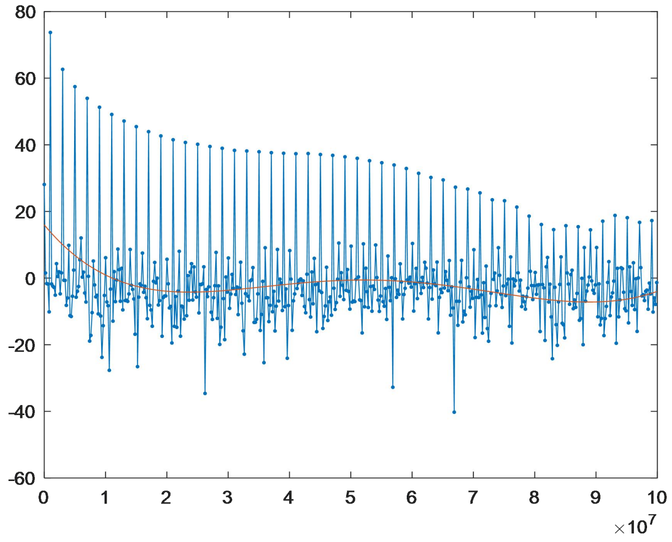


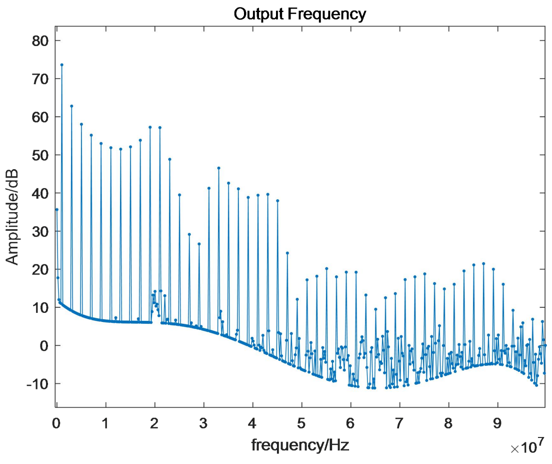
Analyze the signal characteristics

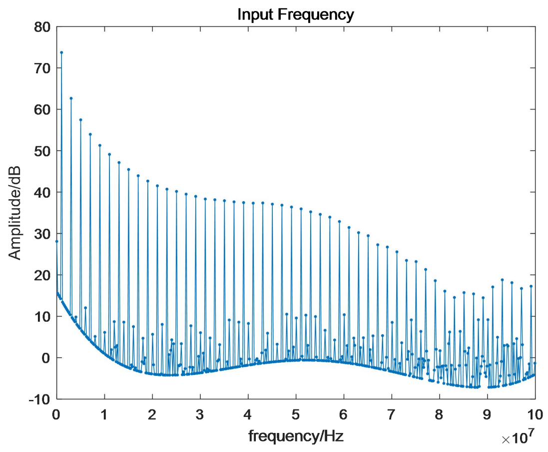
Fifth order fitting

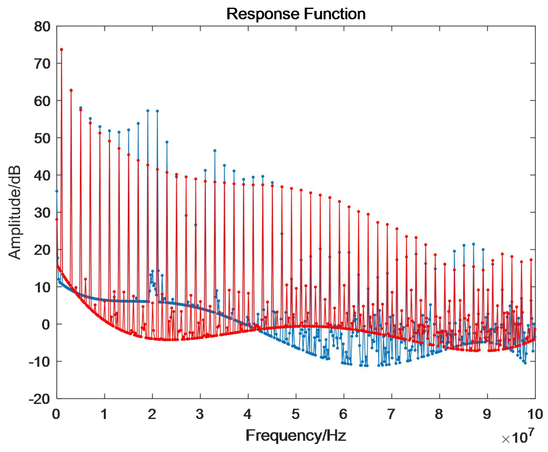


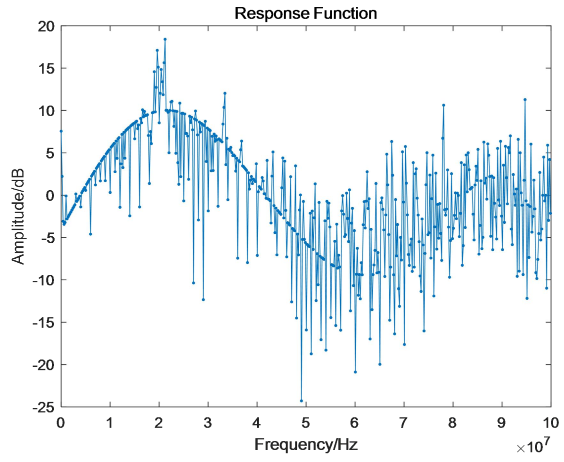






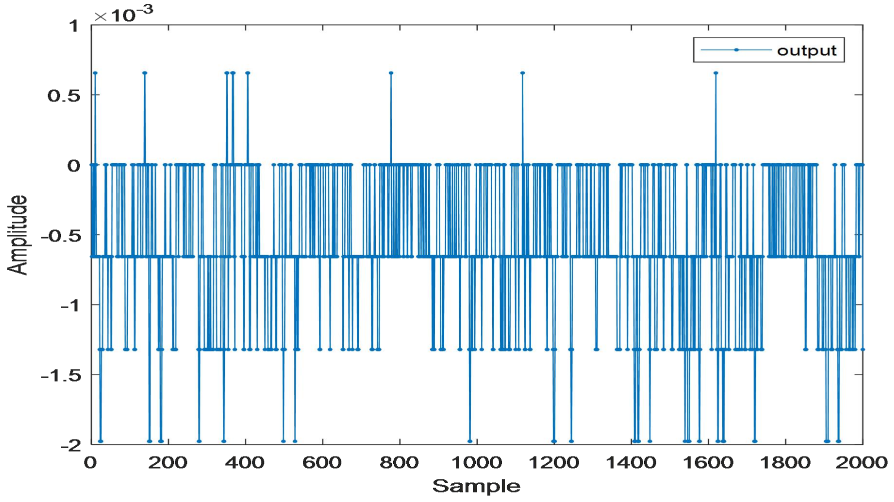


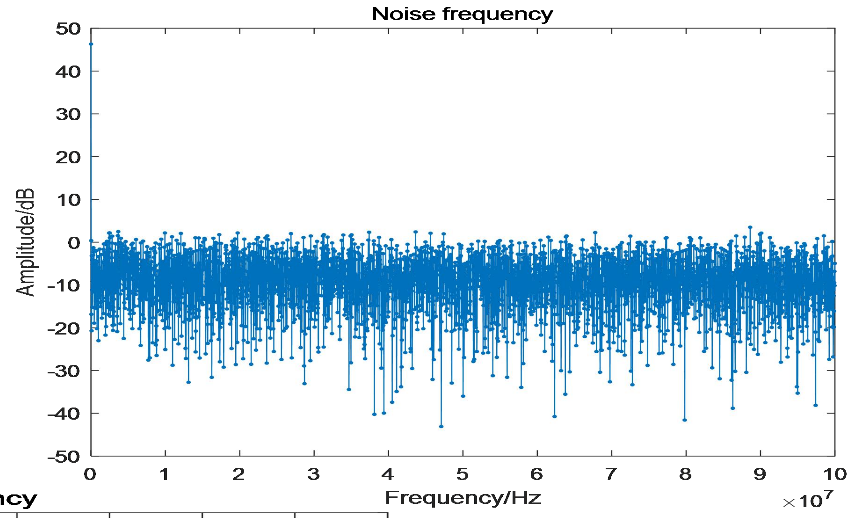


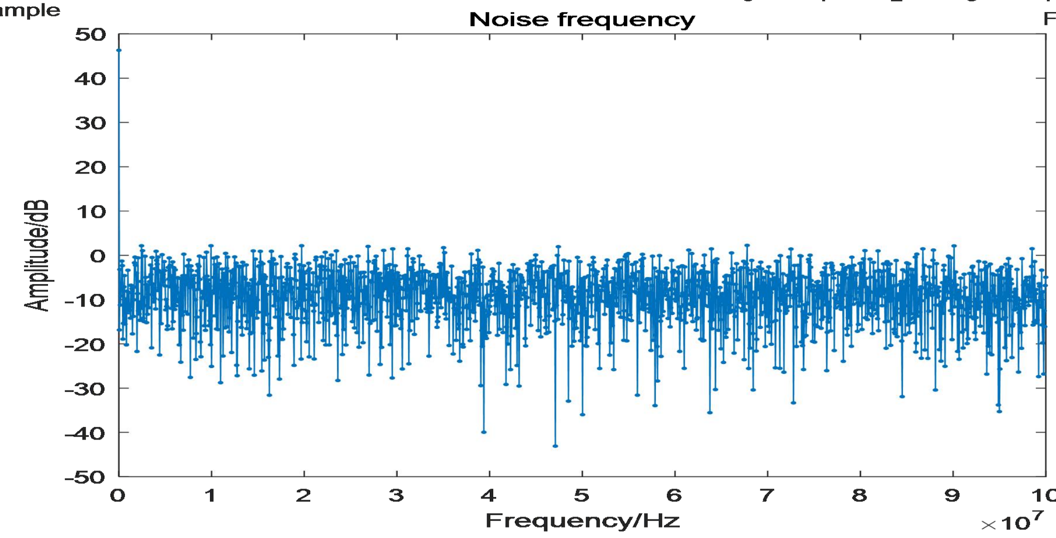


Analyze the signal characteristics

Method 3

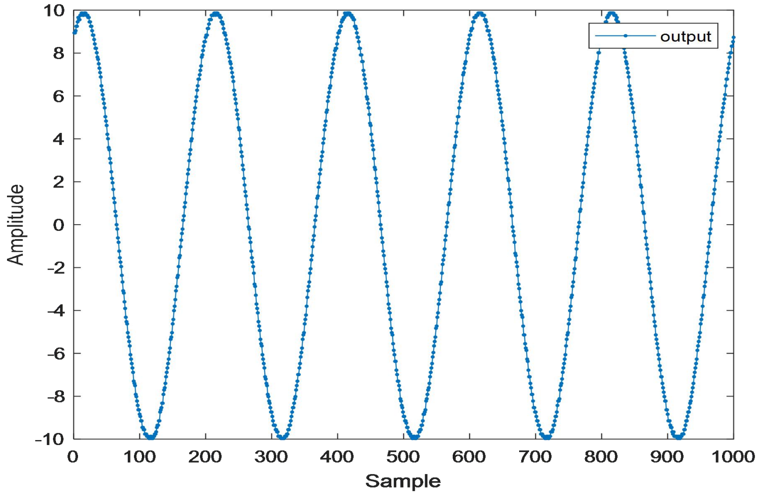


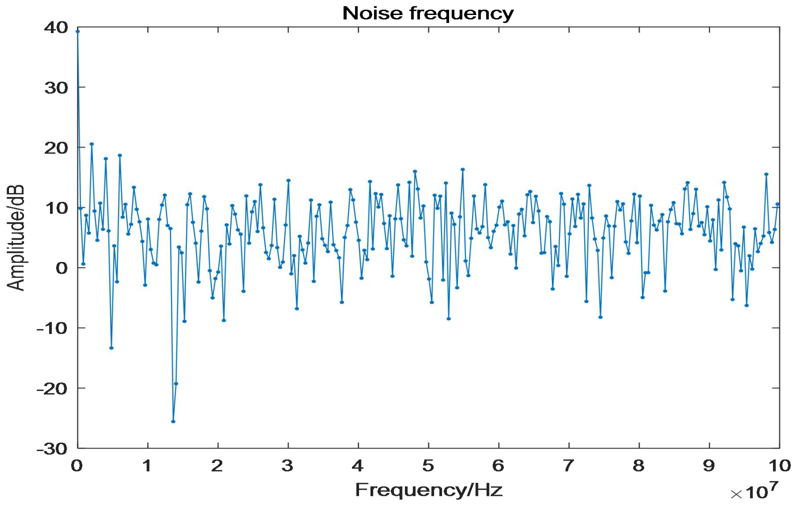


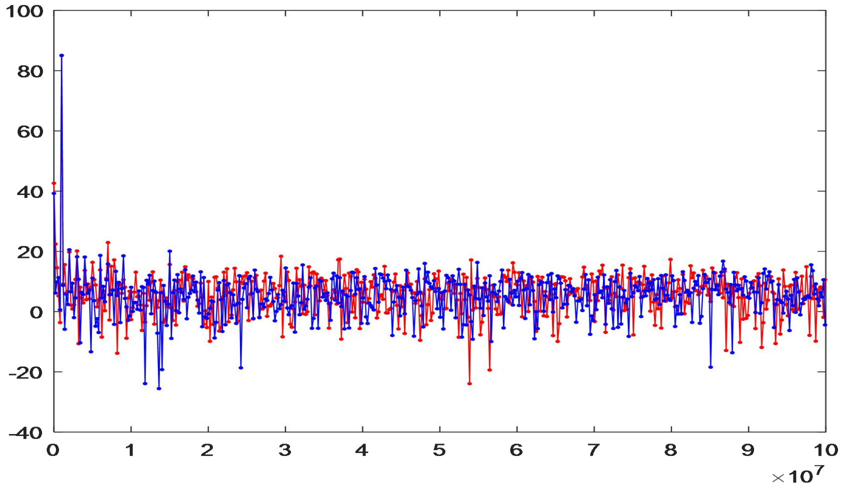


Analyze the signal characteristics

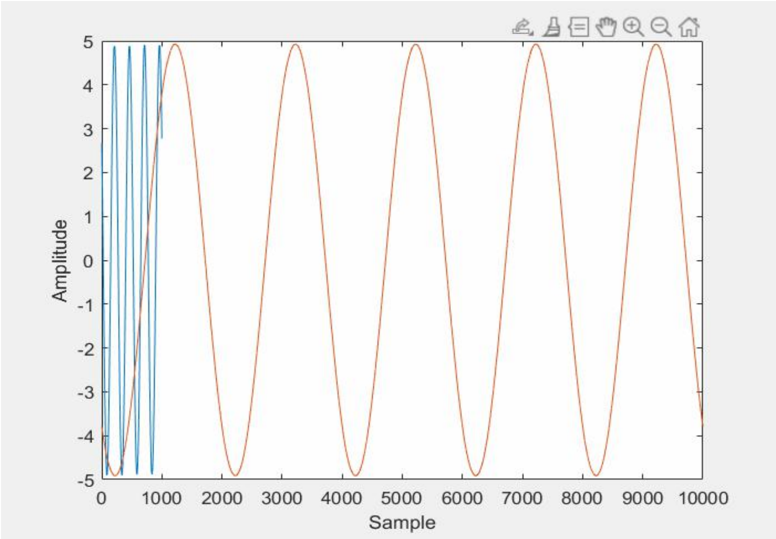
Method 4

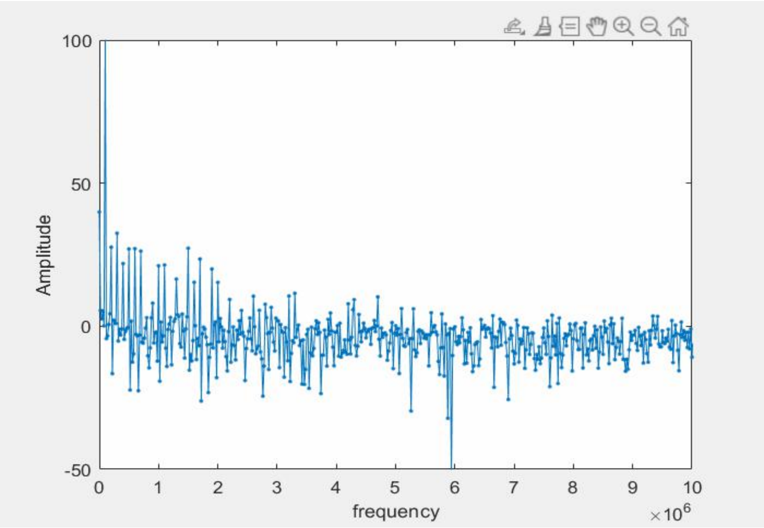


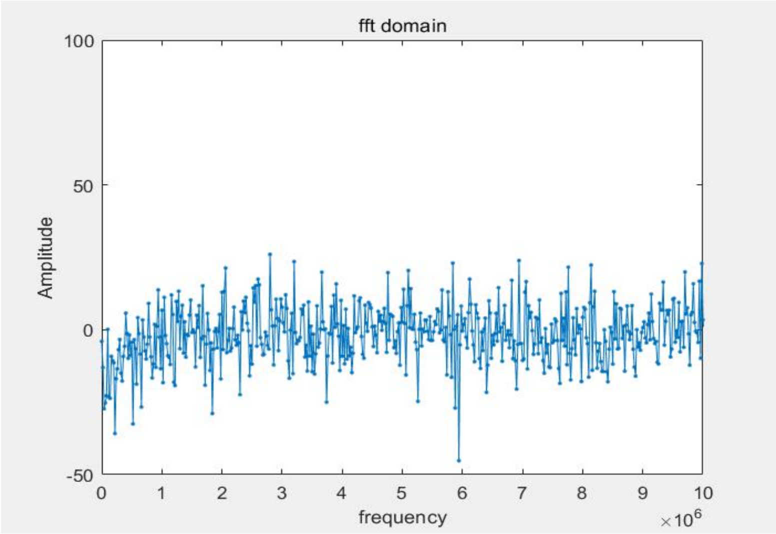


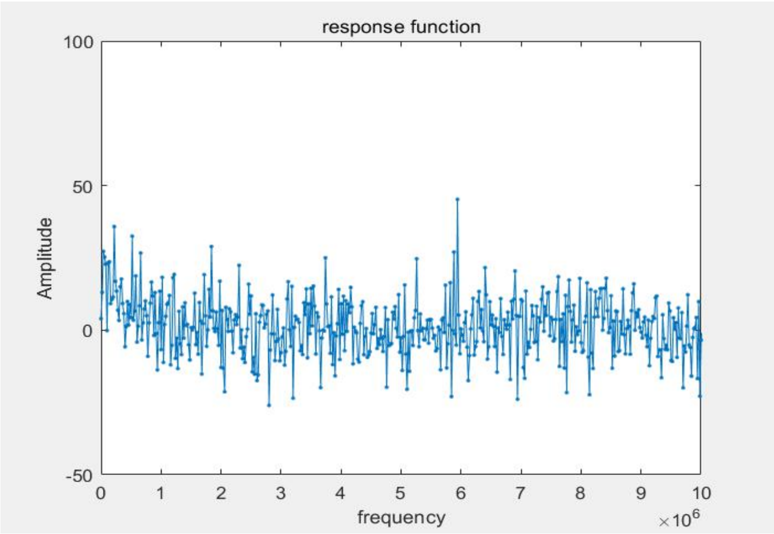


Measurement by sweeping frequency

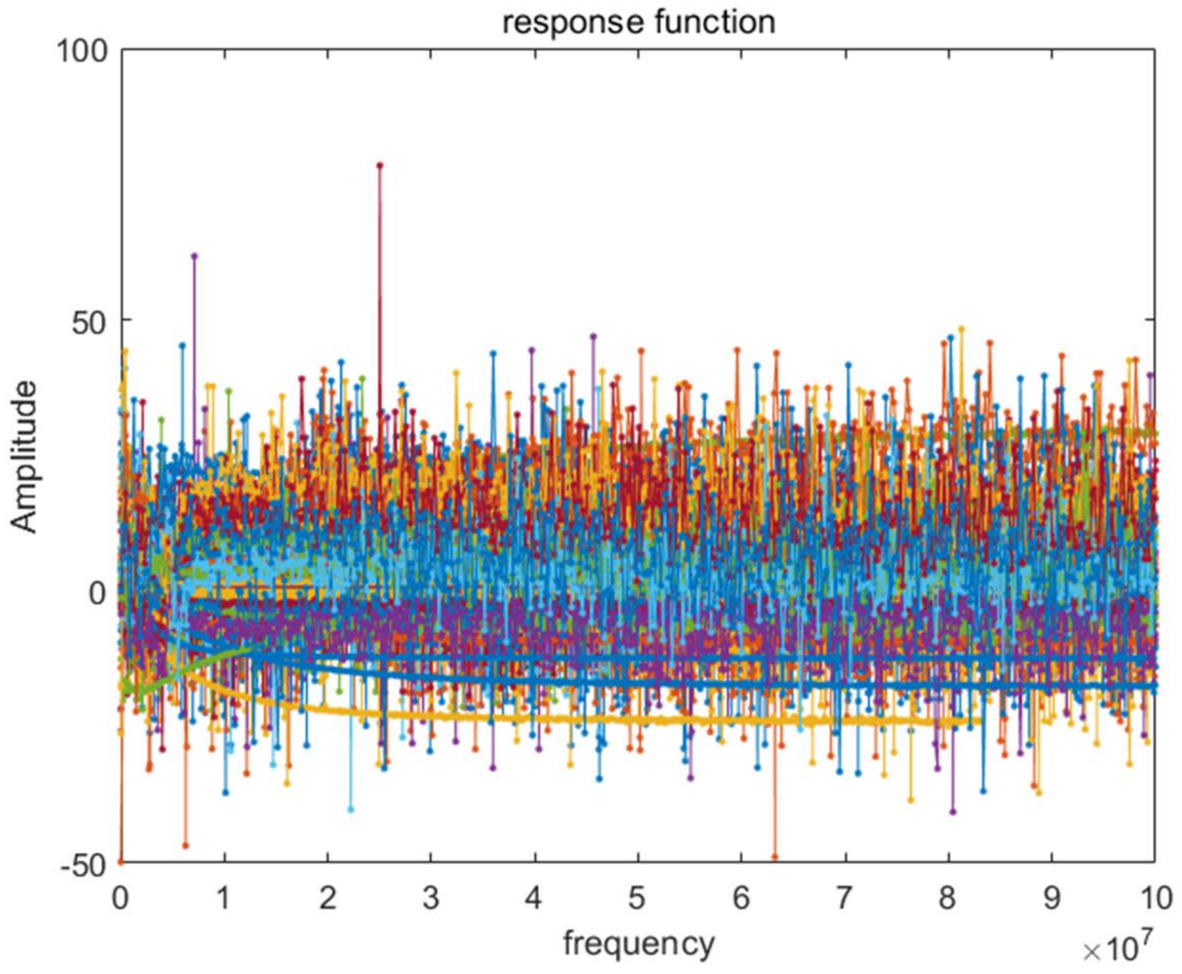




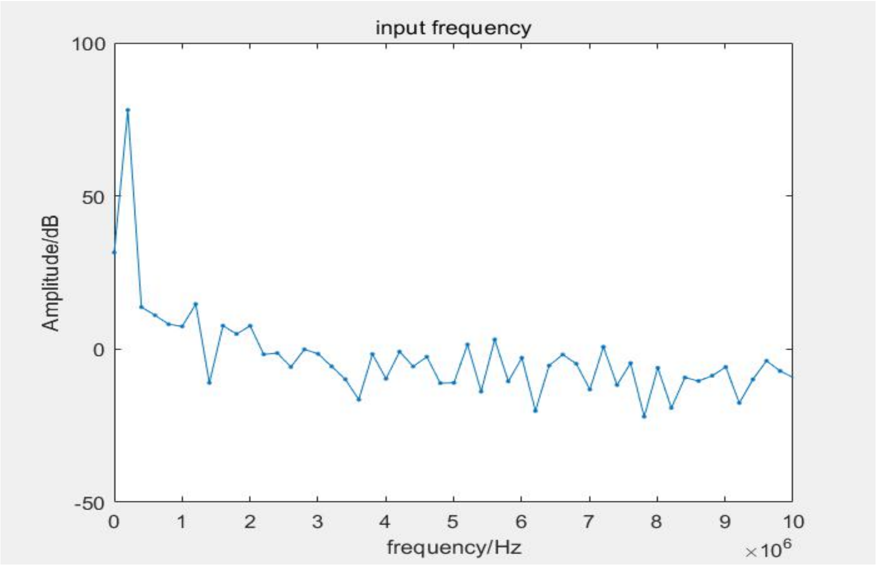


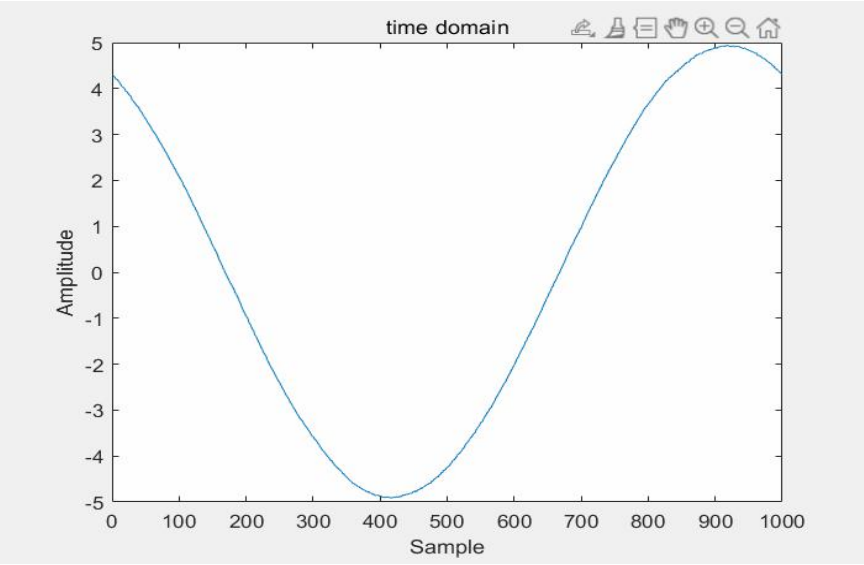


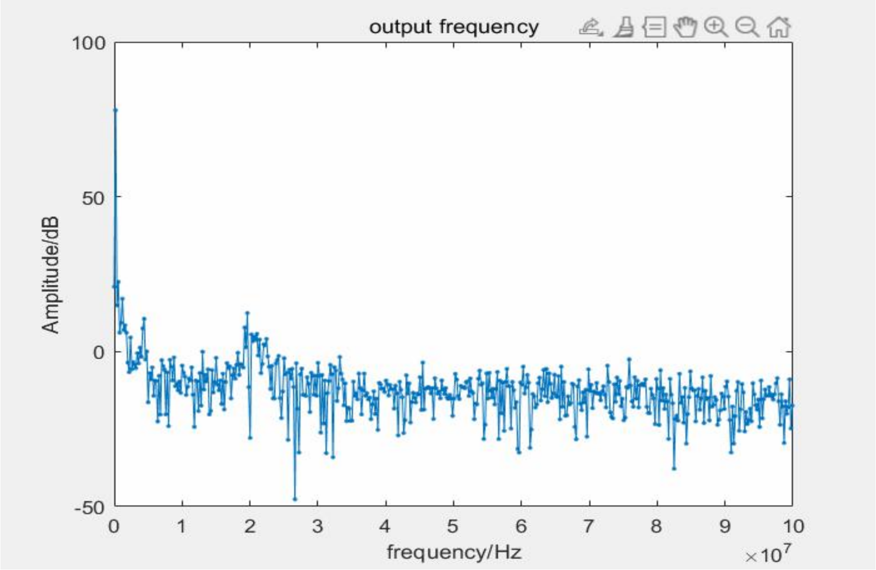
Measurement by sweeping frequency

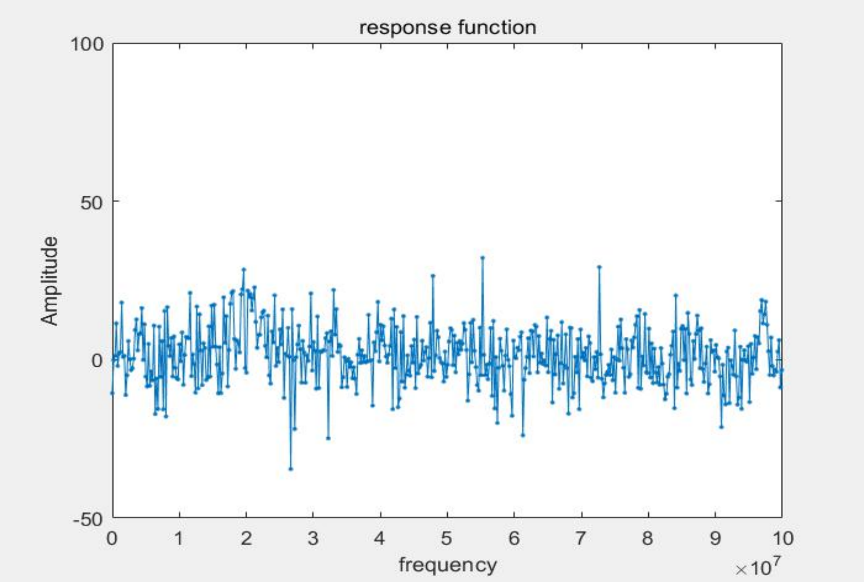


Measurement by sweeping frequency

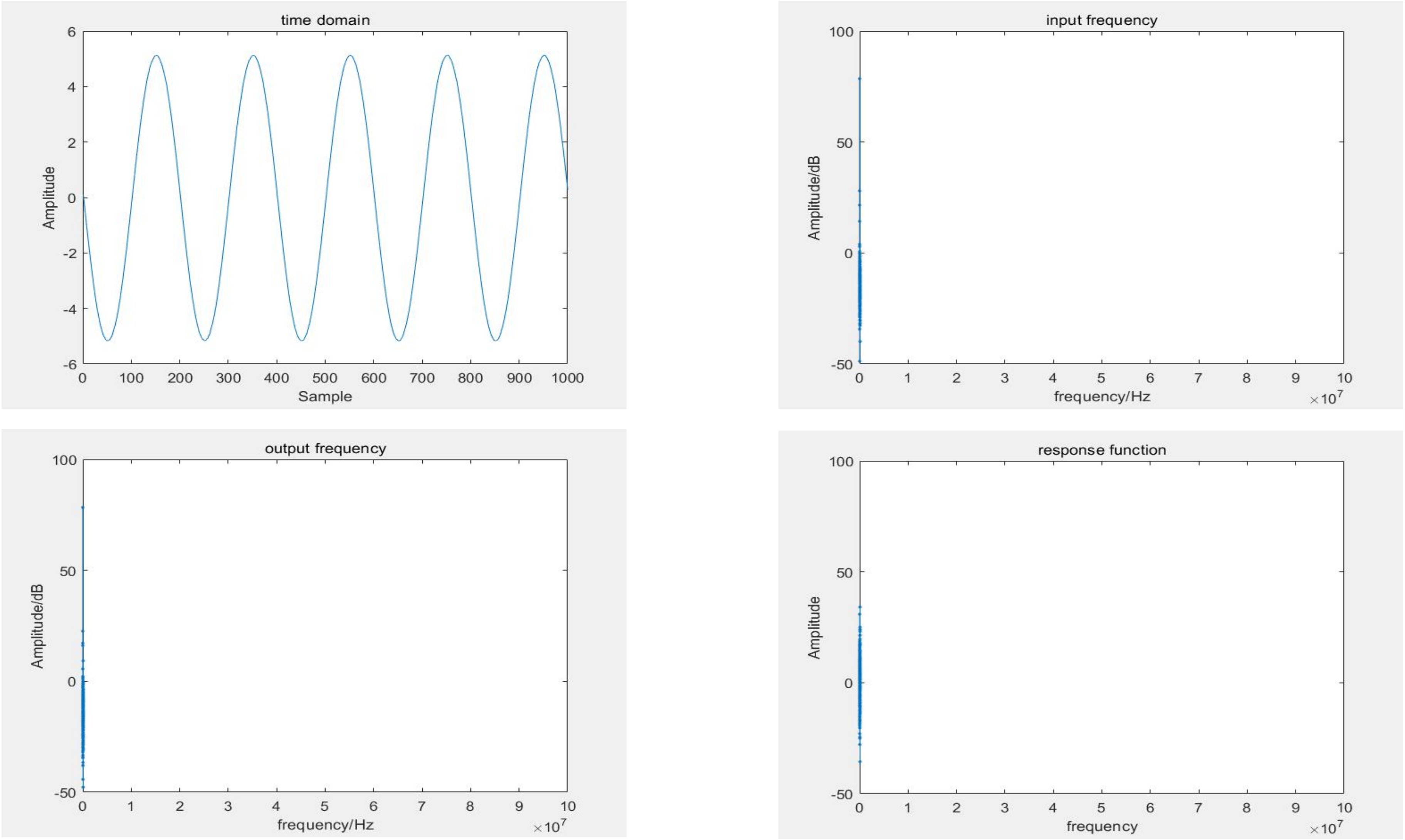




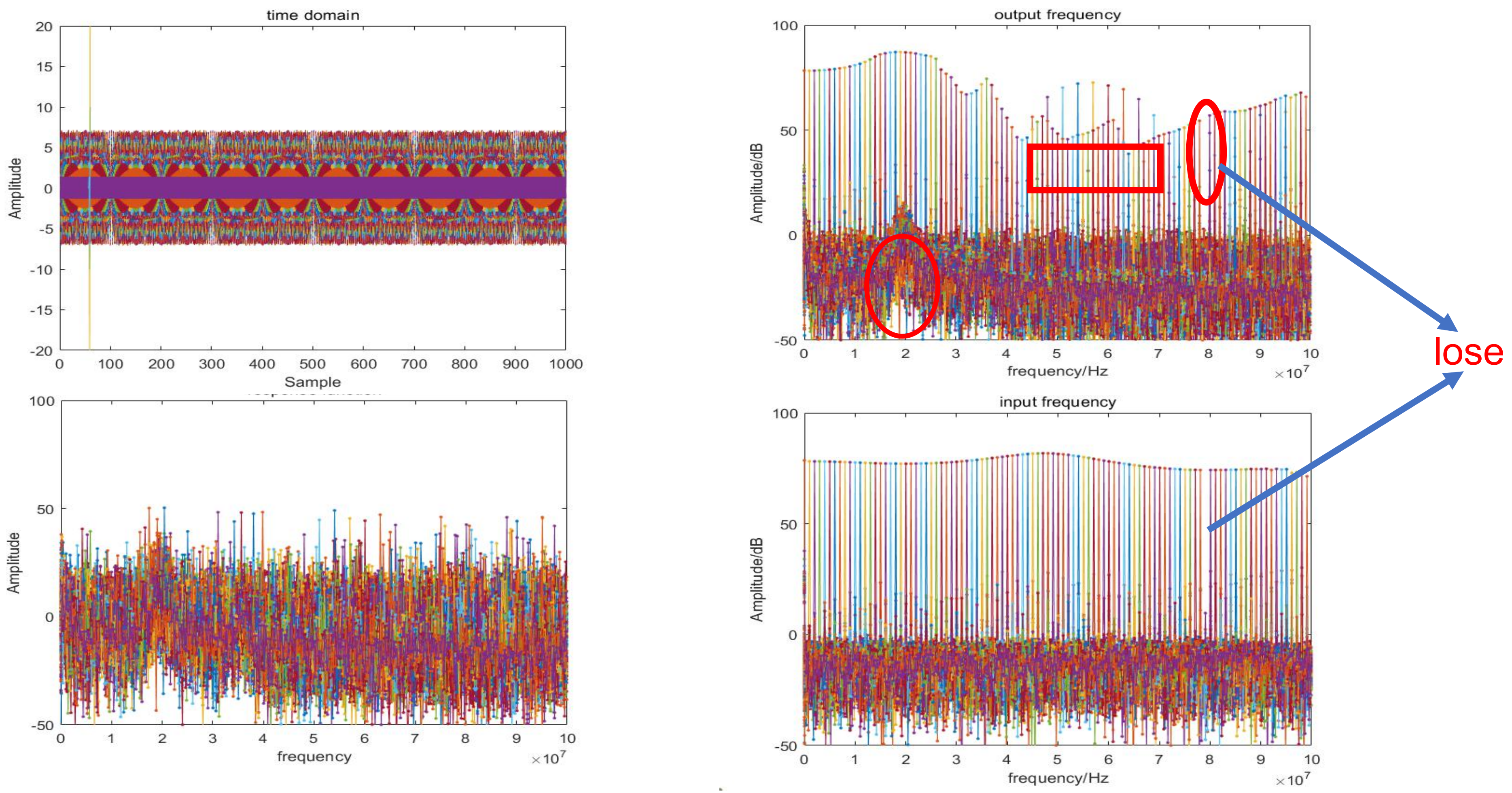




Measurement by sweeping frequency



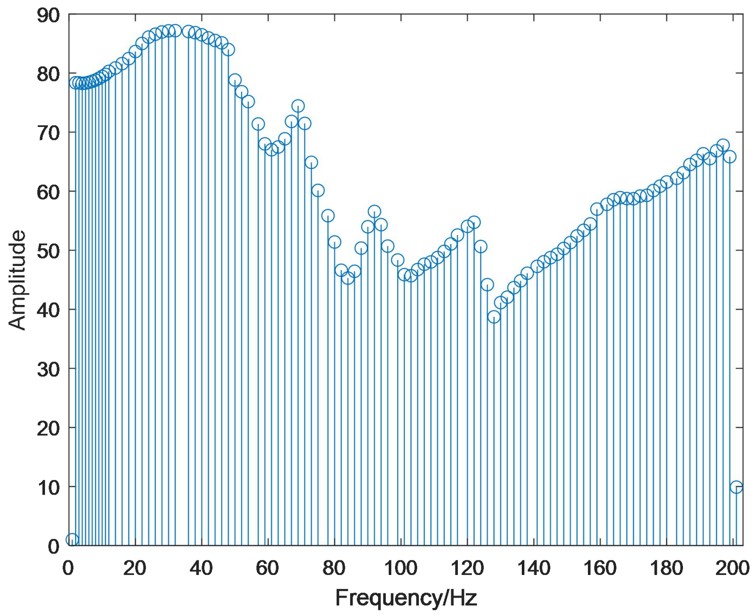
Measurement by sweeping frequency



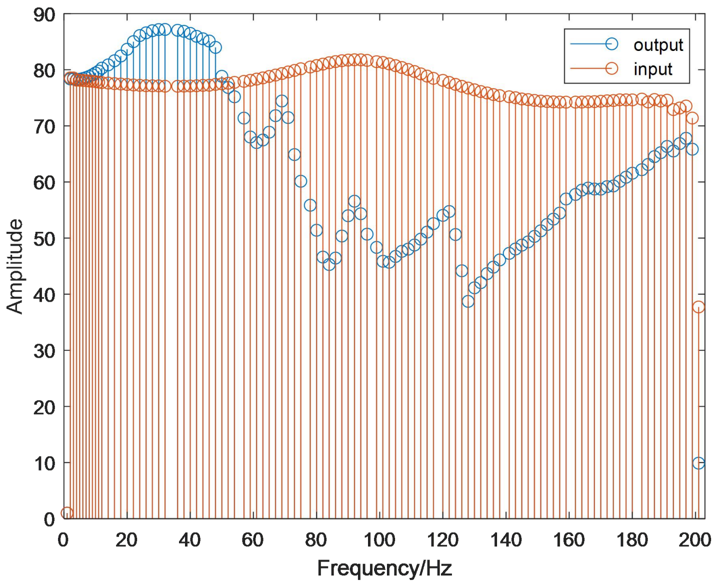
How to calculate transfer function by choose each frequency.

Draw waterfall figure

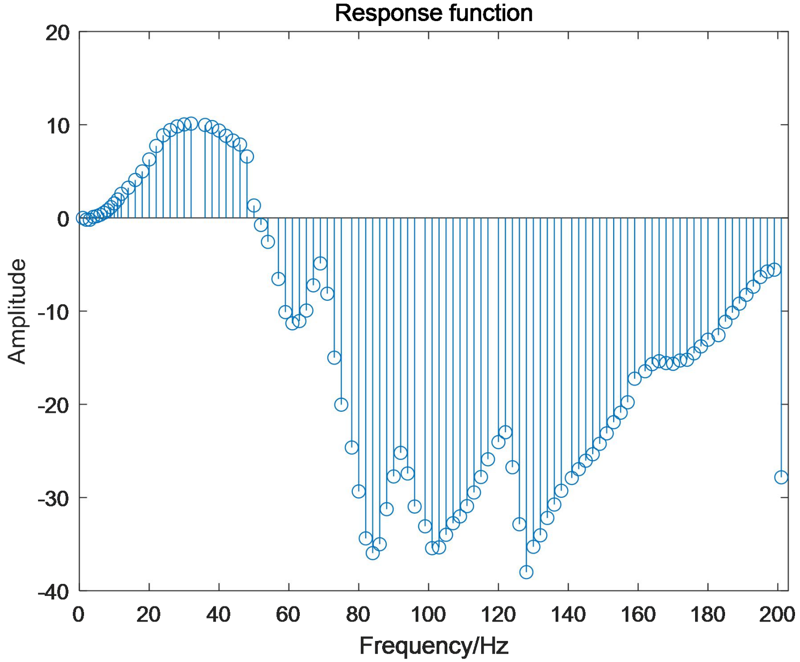
we will remove the remain frequency except the frequency which we want.



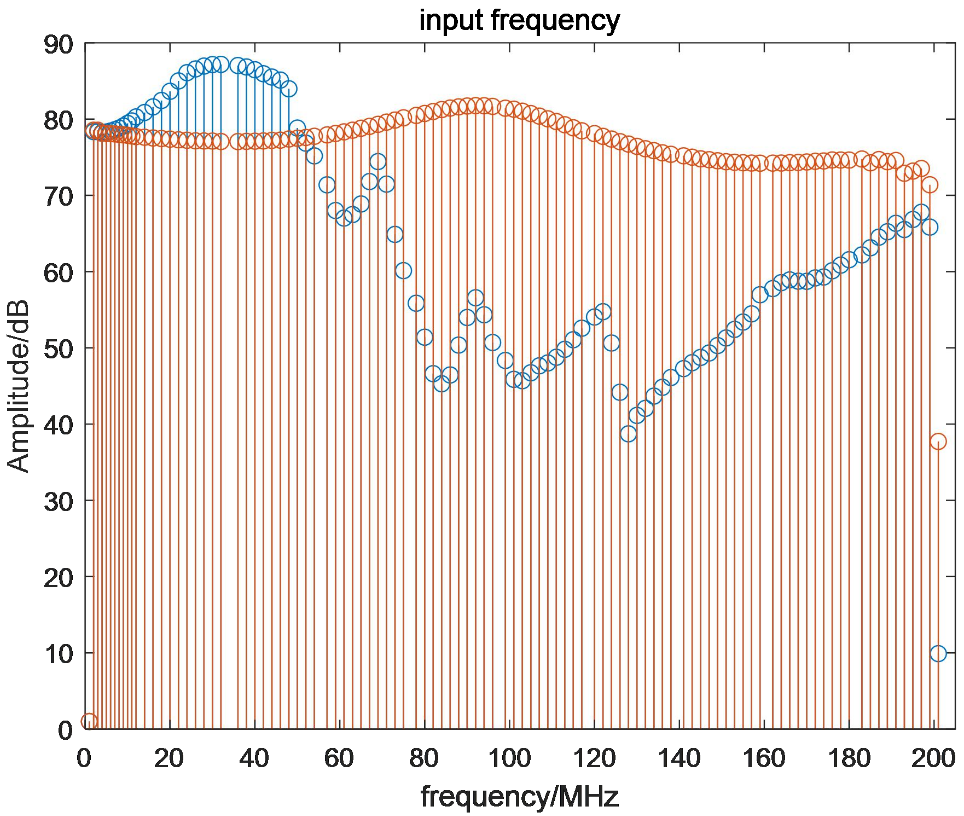
Amplitude
Frequency/Hz

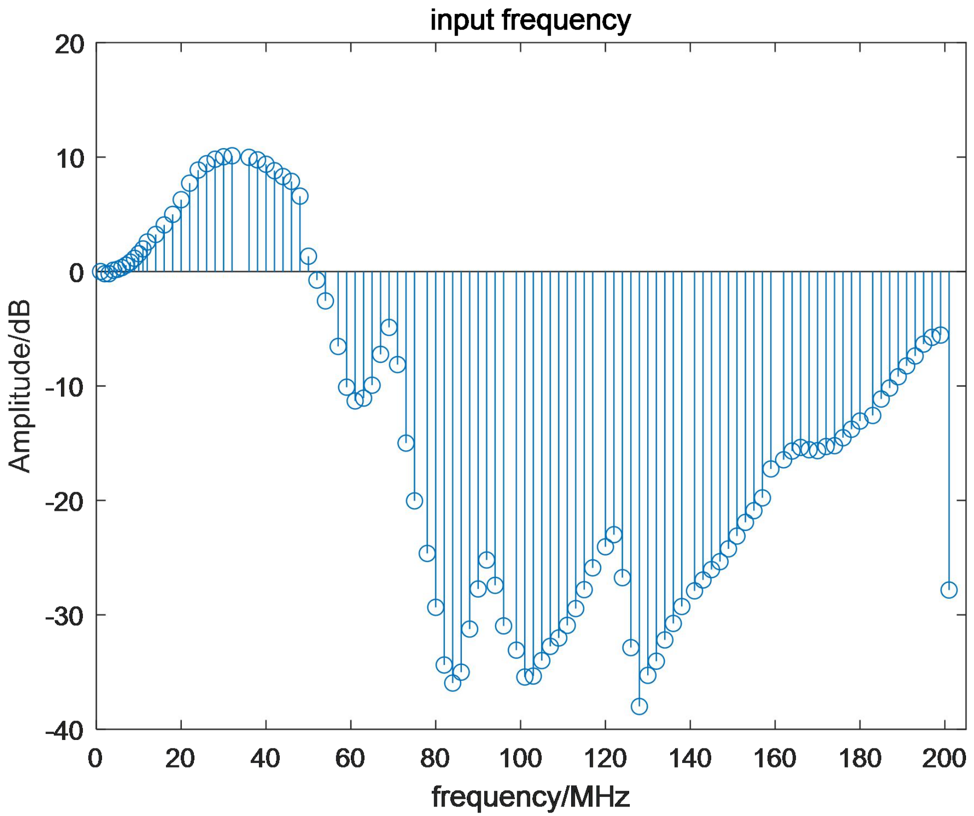


output
input
Amplitude
Frequency/Hz



Response function
Amplitude
Frequency/Hz


input frequency
Amplitude/dB
frequency/MHz
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120
140
160
180
200


input frequency
Amplitude/dB
frequency/MHz
-40
-30
-20
-10
0
10
20
0
20
40
60
80
100
120
140
160
180
200

Question and conclusion/next work

Outer zone electrons have long been measured at geosynchronous orbit ($L = 6.6$ where L shell is a parameter describing a set of geomagnetic field lines that cross the Earth's magnetic equatorial plane at a number of R_E), where weather, navigation, communications, and national security satellites abound, extending into

1. What is L shell.
2. Draw a waterfall figure